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(71) Applicant:
Kitano Engineering Co., Ltd.
Komatsushima-shi, Tokushima-ken 773 (JP)

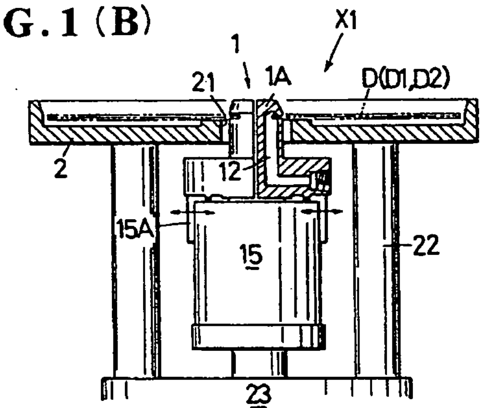
(72) Inventor:
Amo, Mikuni, c/o Kitano Eng. Co., Ltd.
Komatsushima-shi, Tokushima-ken 773 (JP)

(74) Representative:
Goddar, Heinz J., Dr. et al
FORRESTER & BOEHMERT
Franz-Joseph-Strasse 38
80801 München (DE)

(54) Method of correcting nonalignment of a storage disc

(57) In a technique for bonding two disc-shaped resin substrates (D1 and D2) constituting the storage disc (D), the disc-shaped resin substrates (D1 and D2) are centered to correct the nonalignment therebetween. The method comprises steps of placing disc-shaped resin substrates (D1 and D2), which have central holes (DH) and constitutes the storage disc (D) and intervene an adhesive (R) therebetween, on a centering holding table (X1) provided with a boss, spreading the boss (1) inserted into the central holes (DH) the disc-shaped resin substrates (D1 and D2) outward for centering the disc-shaped resin substrates (D1 and D2), and partially irradiating an adhesive (R) interposed between the disc-shaped resin substrates (D1 and D2) with UV rays for curing the disc-shaped resin substrates (D1 and D2) in the vicinity of the centers thereof to temporarily fix the disc-shaped resin substrates (D1 and D2). The nonalignment between the disc-shaped resin substrates (D1 and D2) is corrected, making the quality of the storage disc (D) high. Further, the boss (1) inserted into the central hole of the storage disc (D) is used to center the disc-shaped resin substrates (D1 and D2), which prevents the apparatus from being complex, and manufactures the apparatus at low cost.

FIG.1 (B)



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Description

The present invention relates to a storage disc, particularly to a method of correcting nonalignment between disc-shaped resin substrates each constituting a storage disc.

Computers, especially personal computers are remarkably popularized recently, and capacity of storage medium to be used thereby, particularly capacity of a storage disc has been high dense and kinds of the storage media are increased, and also application thereof to various fields has been increased. Accordingly, in a CD for mainly use in music, there is a tendency that the storage disc is developed to a video disc.

There are a magnetic disc, an optical disc (e.g., CD-ROM), an optical magnetic disc (e.g., MO), etc. as the storage disc. The demand of the optical disc as the storage disc is increased recently.

Exemplifying an optical disc called as a DVD, a disc-shaped resin substrate that is a single plate constituting the DVD is required to have a thickness of 0.6 mm and an outer diameter of 120 mm and an inner diameter of its central hole of 15 mm. If such a disc-shaped resin substrate is formed of a single one, it is low in a mechanical strength and is easily deformable. Accordingly, the disc-shaped resin substrates each having the same thickness (0.6 mm) are bonded to each other to form an integrated substrate.

For example, Figs. 11(A) and (B) schematically generally show a DVD serving as an optical disc formed of two disc-shaped resin substrates (a first disc-shaped resin substrate D1 and a second disc-shaped resin substrate D2) which are bonded to each other.

Information signal is applied to one disc-shaped resin substrate D1, namely information is stored in one disc-shaped in Fig. 11(A) while it is stored in both disc-shaped substrates D1 and D2 in Fig. 11(B).

An optical disc D formed by bonding two disc-shaped resin substrates D1 and D2 receives light reflected from the reflection film D11 using laser beam by a light detector, not shown, to thereby reproduce signals.

Since the high density storage disc including the DVD is not used by the single substrate or plate but it is frequently used by the plural substrates or plates, the first disc-shaped resin substrate D1 and the second disc-shaped resin substrate D2 are needed to be bonded to each other.

The following series of steps are performed to form an integrated storage disc (i.e., an optical disc) by bonding each single plate (see Fig. 12).

Step 1: placing the first disc-shaped resin substrate D1 on a rotary holding table X;
Step 2: coating an adhesive R onto the first disc-shaped resin substrate D1;
Step 3: placing the second disc-shaped resin substrate D2 on the first disc-shaped resin substrate D1;
Step 4: developing the adhesive R interposed between the first and second disc-shaped resin substrates D1 and D2; and
Step 5: curing the thus developed adhesive R.

These steps are explained in more detail.

In Step 1, the first disc-shaped resin substrate D1 having thereon information storage surface coated with a reflection film and a protection film is uniformly drawn by and held on the rotary holding table X.

In Step 2, the adhesive R, e.g., UV curing resin is slowly discharged from a discharge nozzle N while the rotary holding table X on which the first disc-shaped resin substrate D1 is placed is rotated at low speed (several ten rpm). The adhesive R has a different track on the first disc-shaped resin substrate D1 depending on a manner how it is discharged from the discharge nozzle N, but it is preferable to have a doughnut-shaped track as shown in Figs. 11(A) and 11(B).

In Step 3, a transparent second disc-shaped resin substrate D2 is placed on the first disc-shaped resin substrate D1 which is coated with the adhesive R. The receiver 2 may be formed of a transparent one on which no information signal is applied or formed of a one on which an information signal is applied.

In Step 4, the adhesive R interposed between the first and second disc-shaped resin substrates D1 and D2 is developed to extend uniformly between the first and second disc-shaped resin substrates D1 and D2.

This development of the adhesive R is performed by rotating the rotary holding table X at high speed (normally, several thousands rpm or more for about several seconds) in a state where the storage disc D, namely, the integrated disc-shaped resin substrate formed by bonding the first and second disc-shaped resin substrates D1 and D2 is placed on the rotary holding table X.

When the rotary holding table X is rotated at high speed, surplus adhesive R which is present between the bonded first and second disc-shaped resin substrates D1 and D2 is scattered outside while it is developed, and air (air bubble, etc.) confined between the first and second disc-shaped resin substrates D1 and D2 is discharged outside so that the adhesive R can be uniformly developed between the first and second disc-shaped resin substrates D1 and D2. During the development of the adhesive R, the adhesive R is drawn in the direction of the center through the boss of the rotary holding table which is inserted into the central hole of the storage disc.

In Step 5, the optical disc which has been irradiated with UV rays, namely, after the first and second disc-shaped resin substrates D1 and D2 are irradiated with UV rays in a state where the optical disc is slowly rotated (e.g. at about several rpm which is very slower than the rpm in the developing state set forth above) or not rotated so that the adhesive R, e.g., a UV curing

resin layer is cured.

More in detail, the adhesive R is irradiated with UV light source UL provided with a reflection mirror at the back side thereof, thereby effectively curing the adhesive.

Further, the curing step is differentiated due to the kind of the adhesive R to be used, and hence it is needless to say that a curing method conforming to the characteristic of the adhesive to be used is employed. In such a manner, the bonding step is completed.

In the type for storing information in the disc-shaped resin substrates D1 and D2, there are two types of outputting information from the storage disc. First is a type for reading the information or signal by applying light from one direction (a method of reading information from a storage disc of a type having a standard used by a dual layer DVD), and second is a type for reading information by applying light from both directions (a method of reading information from a storage disc used by a single layer or double-sided DVD). In the first type, there is out of alignment between the disc-shaped resin substrates D1 and D2, and hence information applied in the disc-shaped resin substrates D1 and D2 cannot be correctly read, if both central holes are not concentrically positioned.

Fig. 10 shows a state where the nonalignment occurs between the disc-shaped resin substrates D1 and D2 wherein there occurs also the slippage of information stored in the disc-shaped resin substrates D1 and D2. If the disc-shaped resin substrates D1 and D2 are bonded with each other in this state, the information can be not correctly read from one direction.

Meanwhile, in a standard of dual layer DVD, it is preferable that the nonalignment between the disc-shaped resin substrates D1 and D2 does not exceed 15μm to prevent the DVD from becoming a defective product. The nonalignment has already occurred in a state where the disc-shaped resin substrate D2 is placed on the disc-shaped resin substrate D1.

In the next developing step, the adhesive is developed on the rotary holding table on which the disc-shaped resin substrates D1 and D2 are placed while there occurs the nonalignment therebetween.

In the developing step, the boss 1 on the rotary holding table is inserted into the central holes of the disc-shaped resin substrates D1 and D2 to temporarily position the disc-shaped resin substrates D1 and D2. Since there is defined a slight difference between the outer diameter of the boss 1 and the diameters of the central holes of the disc-shaped resin substrates D1 and D2, a minute nonalignment between the disc-shaped resin substrates D1 and D2 cannot be corrected although they are positioned by the boss 1.

Accordingly, the nonalignment between the disc-shaped resin substrates D1 and D2, are not corrected but remains as it is, even if the developing step of the adhesive is completed.

Although the adhesive is cured on the entire surfaces on the disc-shaped resin substrates D1 and D2 in the curing step upon completion of the developing step, the nonalignment remains as it is, namely, it is fixed when the adhesive is cured, which permits the nonalignment to remain on the final product.

Under the circumstances, it is necessary that the nonalignment between the disc-shaped resin substrates D1 and D2 must be removed or corrected to the utmost before the curing step.

The present invention has been made to solve the above problems. That is, it is an object of the invention to provide a method of correcting nonalignment between two disc-shaped resin substrates of a storage disc in a technique for bonding two disc-shaped resin substrates by correcting the centers thereof before an adhesive developed between two substrates is cured.

It is another object of the present invention to provide a method of maintaining corrected nonalignment between the disc-shaped resin substrates.

The inventor of this application has devoted himself to research the above mentioned problems, and has found that the nonalignment between the disc-shaped resin substrates can be corrected if a pressing force is applied radially to the inner ends of the central holes of the disc-shaped resin substrates before the curing step. Based on this finding, the present invention has been completed.

To achieve the above object, a method of correcting nonalignment of a storage disc according to a first aspect of the invention comprises comprising steps of placing disc-shaped resin substrates, which have central holes and constitutes the storage disc and intervene an adhesive therebetween, on a centering holding table provided with a boss, and spreading the boss outward for centering the disc-shaped resin substrates.

A method of correcting nonalignment of a storage disc according to a second aspect of the invention comprises steps of placing disc-shaped resin substrates, which have central holes and constitutes the storage disc and intervene an adhesive therebetween, on a centering holding table provided with a boss, spreading the boss 1 inserted into central holes the disc-shaped resin substrates outward for centering the disc-shaped resin substrates, and partially irradiating an adhesive interposed between the disc-shaped resin substrates with UV rays for curing the disc-shaped resin substrates in the vicinity of the centers thereof to temporarily fix the disc-shaped resin substrates.

A method of correcting nonalignment of a storage disc according to a third aspect of the invention comprises steps of placing disc-shaped resin substrates, which have central holes and constitutes the storage disc and intervene an adhesive therebetween, on a centering holding table provided with a boss, spreading the boss 1 inserted into central holes the disc-shaped resin substrates outward for centering the disc-shaped resin substrates, drawing the adhesive in the directions of the central holes of the disc-shaped resin substrates

through the boss, and partially irradiating an adhesive interposed between the disc-shaped resin substrates with UV rays for curing the disc-shaped resin substrates in the vicinity of the centers thereof to temporarily fix the disc-shaped resin substrates.

Other aspects of the invention will be understood from the description and claims set forth hereunder together with the attached drawings.

When a method of developing the adhesive set forth above is employed, an external force is applied to an inner end of the central holes of the disc-shaped resin substrates so as to surely correct the nonalignment therebetween. Further, when the disc-shaped resin substrates are temporarily fixed, the nonalignment is corrected thereafter so that the concentrically arranged state between the disc-shaped resin substrates are maintained.

Fig. 1(A) and 1(B) show a centering holding table wherein Fig. 1 (A) is a plan view and Fig. 1(B) is a side view a part of which is a cross sectional view;
Figs. 2(A) and 2(B) are perspective views of a boss wherein Fig. 2(A) shows a contracted state of the boss, Fig. 2(B) is an enlarged state thereof;
Fig. 3 is an enlarged view of a block constituting the boss in Figs. 2(A) and 2(B);
Figs. 4(A) and 4(B) are views explaining a principle of correction of nonalignment between the disc-shaped resin substrates by the boss wherein Fig. 4(A) shows a close state of the boss and Fig. 4(B) shows a relation between the disc-shaped resin substrate and the boss;
Figs. 5(A) and 5(B) are views explaining a principle of correction of nonalignment by the boss wherein Fig. 5(A) shows an opened or enlarged state of the boss and Fig. 5(B) shows a relation between the disc-shaped resin substrate and the boss;
Figs. 6(A) and 6(B) are views showing steps of correcting nonalignment;
Figs. 7(A) and 7(B) are block diagrams showing steps of correcting nonalignment;
Figs. 8(A) and 8(B) are views showing a suction or drawings operation wherein Fig. 8(A) shows a state where development is not completed and Fig. 8(B) shows a state where development is completed;
Figs. 9(A) and 9(B) are views showing another drawing operation wherein Fig. 8(A) shows a state where development is not completed and Fig. 8(B) shows a state where development is completed;
Figs. 10(A) and 10(B) are views each showing the state where two disc-shaped resin substrates are out of alignment, wherein Fig. 10(A) is a plan view and Fig. 10(B) is a cross sectional view;
Fig. 11 is a schematic cross sectional view showing a storage disc (for example, a DVD as an optical disc); and
Fig. 12 is a schematic view showing a bonding step of the disc-shaped resin substrates.

It is a key point in a method of correcting nonalignment between disc-shaped resin substrates that inner ends of central holes DH of the disc-shaped resin substrates are pressed or spread outward by a boss. Accordingly, a centering holding table for pressing the inner ends of the central holes DH outward will be first described.

Fig. 1(A) and 1(B) show a centering holding table wherein Fig. 1 (A) is a plan view and Fig. 1(B) is a side view a part of which is a cross sectional view.

The centering holding table X1 comprises a disc-shaped receiver 2 supported by struts 22, a boss 1 which is inserted and disposed in a central hole 21 defined in the center of the receiver 2. A thick part is provided at the periphery of the central hole 21 and the central portions of the disc-shaped resin substrates D1 and D2 are supported by this thick part.

The struts 22 for supporting the receiver 2 are fitted to a base 23. The boss 1 which is inserted and arranged in the central hole 21 of the receiver 2 is inserted into the central hole DH of the optical disc when the disc-shaped resin substrate D (disc-shaped resin substrates D1 and D2) is placed on the receiver 2. The boss 1 can be enlarged radially by a cylinder chuck 15.

Figs. 2(A) and 2(B) are perspective views of a boss wherein Fig. 2(A) shows a contracted state of the boss and Fig. 2(B) is an enlarged state.

The boss 1 comprises three L-shaped blocks 1A. When each block 1A is moved radially outward, the entire boss 1 is enlarged radially from the state shown in Fig. 2(A) to the state shown in Fig. 2(B).

Fig. 3 is an enlarged view of the block 1A of the boss 1. The block 1A comprises a vertical part 10A and a horizontal part 10B which are integrated with each other to be formed in an L-shape.

A suction passage 12 is formed by communicating with the vertical and horizontal parts 10A and 10B, and a slit-shaped suction or drawing groove 11 is defined at the periphery of the 10A by cutting shallow into the surface of the vertical part 10A.

An end 13 of the suction passage 12 provided in the horizontal part 10B is connected with a pipe, not shown, and communicates with a controllable negative pressure source. The drawing groove 11 is provided for sucking or drawing an adhesive R between the disc-shaped resin substrates D1 and D2 by the boss 1 so that the adhesive R can be sufficiently developed in the central direction. The width of the drawing is about 0.5 mm.

The vertical parts 10A of each block 1A are arranged at an angle of 120 degrees as shown from the above, and one boss 1 is assembled by combining three blocks 1A. In the boss 1, a horizontal bottom surface 14 of the block 1A is fixed to a movement jaw 15A of the cylinder chuck 15. The movement jaw 15A is movable radially by a piston incorporated into the cylinder chuck 15, not shown.

Since the cylinder chuck 15 has three movement

jaws 15A, it is movable radially together with the movement of the movement jaw 15A when these blocks 1A are fixed. Accordingly, the boss 1 can be enlarged radially as a whole.

Each of intervals W between blocks 1A is freely changed by the cylinder chuck 15 from a state where the blocks 1A are closed to a state where the blocks 1A are opened or vice versa. The cylinder chuck 15 is a known type. When the boss 1 is made in a contracted state and an enlarged state, it is possible to center the disc-shaped resin substrates D1 and D2 for correcting the nonalignment between the disc-shaped resin substrates D1 and D2.

In the contracted state, the diameter of the boss 1 is set to be slightly narrower than each diameter of the central holes DH of the disc-shaped resin substrates D1 and D2 (e.g., about 0.5 mm). In the enlarged state, the diameter of the boss 1 is set to be substantially the same as each diameter of the central holes DH of the disc-shaped resin substrates D1 and D2 (e.g., about 15 mm). The boss 1 may have an inclined surface T at the upper portion thereof so that it can be easily inserted into the central hole DH. The use of the centering holding table having such a structure makes it possible to center the central holes DH of the disc-shaped resin substrates D1 and D2, thereby correcting the nonalignment therebetween.

The method of correcting the nonalignment between the disc-shaped resin substrates D1 and D2 is preferably carried out using the centering holding table X1 set forth above.

The method will be now described more in detail as follows.

Figs. 4(A) and 4(B) and Figs. 5(A) and 5(B) are views explaining a principle of correction of nonalignment by the boss wherein Fig. 4(A) shows a closed or contracted state and Fig. 5(A) shows an enlarged state of the boss and Fig. 4(B) and Fig. 5(B) show a relation between the disc-shaped resin substrate and the boss.

Figs. 4(A) and 4(B) show a state where there is out of alignment between the disc-shaped resin substrates D1 and D2.

The boss 1 is enlarged radially as a whole when each of the blocks 1A is moved radially outward so as to press the inner ends of the central holes DH of the disc-shaped resin substrates D1 and D2. Accordingly, the disc-shaped resin substrates D1 and D2 are centered by the pressing force.

Meanwhile, Figs. 5(A) and 5(B) show a state where the disc-shaped resin substrates D1 and D2 were centered and the nonalignment therebetween was corrected. It is understood from these views that the nonalignment between the disc-shaped resin substrates D1 and D2 was corrected by the boss 1.

In a state where the disc-shaped resin substrates D1 and D2 are concentrically arranged with each other while the nonalignment therebetween is corrected, they are irradiated partially with UV rays in the vicinity of the center thereof and temporarily fixed.

Figs. 6(A) and 6(B) are views showing steps of correcting nonalignment, and Figs. 7(A) and 7(B) are block diagrams showing steps of correcting nonalignment in a different manner.

The adhesive interposed between the disc-shaped resin substrates D1 and D2 has been already developed in the previous step.

In a placing step, an optical disc (two disc-shaped resin substrates) which was subjected to the developing step is once supplied right over the centering holding table X1, and it is lowered over the centering holding table X1 as it is (see Fig. 6(A)).

At the time when two disc-shaped resin substrates D1 and D2 are placed on the centering holding table X1, the boss 1 is inserted and arranged in the central holes DH of the disc-shaped resin substrates D1 and D2 so that the disc-shaped resin substrates D1 and D2 are substantially centered or positioned.

Next when the cylinder chuck 15 operates, the movement jaws 15A move outward in the radial direction, and at the same time the blocks 1A of the boss 1 move outward in the radial direction (see Fig. 6(B)). As a result, the boss 1 is enlarged, namely, spread out as a whole.

At this time, the boss 1 strongly presses the inner ends of the central hole DH of two disc-shaped resin substrates D1 and D2 at the peripheral surface thereof. The centers of the disc-shaped resin substrates D1 and D2 that are out of alignment so far are centered, i.e. positioned concentrically with each other by the pressing force generated at this time. By this centering, the mutual nonalignment between the disc-shaped resin substrates D1 and D2 are corrected.

In the centering step, it is preferable that the accurate suction or drawing is performed through the drawing groove 11 of the boss 1. In this case the drawing is quickly performed at the same time when the centering is performed or the centering is completed (see Fig. 7(A)).

This drawing is performed after the optical disc is placed on the centering holding table X1 and before the storage disc is irradiated with UV rays in the next temporary fixing step.

Figs. 8(A) and 8(B) are views showing a drawing operation of the adhesive R wherein Fig. 8(A) shows a state where the development to extend to a liquid stop groove is not completed and Fig. 8(B) shows a state where the development is completed.

Figs. 9(A) and 9(B) are views showing a drawing operation wherein Fig. 9(A) shows a state where the development to extend to the inner ends of the central holes DH of the storage disc is not completed and Fig. 9(B) shows a state where the development is completed. The development is completed to agree with a standard as shown in Figs. 8(A) and 8(B) and Figs. 9(A) and 9(B) since the standard of developing state is differentiated depending on the kind of the optical disc. The

drawing groove 11 has a width which is smaller than the thickness of each of the disc-shaped resin substrates D1 and D2, and when it is positioned relative to the adhesive between the disc-shaped resin substrates D1 and D2, the drawing of the adhesive can be accurately performed. When the adhesive is drawn, the development thereof, even if it is insufficient in the previous developing step, can be sufficiently completed.

Then, the disc-shaped resin substrates D1 and D2 are irradiated with UV rays in the vicinity of the central holes DH of the disc-shaped resin substrates D1 and D2 in a temporary fixing step, so that they are temporarily fixed (Fig. 6(C)).

The optical disc is partially irradiation with UV rays. In detail, the disc-shaped resin substrates D1 and D2 are irradiated with UV rays in the vicinity of the centers thereof by a UV irradiation device 3 such as a metal halide lamp which is moved right over the centering holding table X1.

The storage disc is irradiated with UV rays at a region which is slightly wider than a position where a liquid sealed groove is defined. Since the disc-shaped resin substrate is transparent at the position slightly outside the liquid sealed groove or inside the liquid sealed groove, the UV rays can easily pass through the disc-shaped resin substrate, thereby curing the adhesive.

Accordingly the adhesive interposed between disc-shaped resin substrates D1 and D2 in the vicinity of the centers thereof is cured to fix the disc-shaped resin substrates D1 and D2 temporarily and partially. In detail, in the case of Fig. 8(B), the portion several mm outside the liquid sealed groove is cured and temporarily fixed. In the case of Fig. 9(B), the portion several mm inside the liquid sealed groove is cured and temporarily fixed. After the temporary fixation of the disc-shaped resin substrates D1 and D2, they are removed from the centering holding table X1, and then they are subjected to a full curing step by the next irradiation of two disc-shaped resin substrates with the UV rays (see Fig. 6 (D)).

The removal of the disc-shaped resin substrates D1 and D2 from the centering holding table X1 is performed by the cylinder chuck 15. Even if an excessive force is applied to the disc-shaped resin substrates D1 and D2 during the removal thereof, the disc-shaped resin substrates D1 and D2 are not out of alignment again because they are temporarily fixed. The disc-shaped resin substrates D1 and D2 are not out of alignment in the centers thereof after they are temporarily fixed, and hence they remain concentrically positioned, so that they can be easily handled.

Although the present invention has been described with reference to the preferred embodiment, it is not limited to this embodiment, and it can be variously modified without departing from the scope of the gist of the invention.

For example, although the boss 1 comprises three blocks 1A, the number of block 1A is not limited to three, but it may be any number if the disc-shaped resin substrates D1 and D2 can be centered . Although the cylinder chuck 15 is used to press or spread the blocks 1A outward, it may comprise another means having a function to move each block 1A of the boss 1 in a radial direction. Further, the storage disc of this invention can be applied sufficiently to other discs including an optical disc.

With the arrangement of the storage disc manufactured by the present method, the nonalignment between the disc-shaped resin substrates D1 and D2 is corrected, making the quality of the storage disc high. Further, the boss 1 inserted into the central hole DH of the storage disc is used to centering the disc-shaped resin substrates D1 and D2, thereby preventing the apparatus from being complex, and manufactures the apparatus at low cost.

The features disclosed in the foregoing description, in the claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realising the invention in diverse forms thereof.

Claims

1. A method of correcting nonalignment of a storage disc (D) comprising steps of:

   placing disc-shaped resin substrates (D1 and D2), which have central holes (DH) and constitutes the storage disc (D) and intervene an adhesive (R) therebetween, on a centering holding table (X1) provided with a boss; and
   spreading the boss (1) outward for centering the disc-shaped resin substrates (D1 and D2).

2. A method of correcting nonalignment of a storage disc (D) comprising steps of:

   placing disc-shaped resin substrates (D1 and D2), which have central holes (DH) and constitutes the storage disc (D) and intervene an adhesive (R) therebetween, on a centering holding table (X1) provided with a boss;
   spreading the boss (1) inserted into the central holes (DH) of the disc-shaped resin substrates (D1 and D2) outward for centering the disc-shaped resin substrates (D1 and D2); and
   partially irradiating an adhesive (R) interposed between the disc-shaped resin substrates (D1 and D2) with UV rays for curing the disc-shaped resin substrates (D1 and D2) in the vicinity of the centers thereof to temporarily fix the disc-shaped resin substrates (D1 and D2).

3. The method according to Claim 2, wherein the boss (1) comprises a plurality of blocks (1A), and wherein each block (1A) is spread outward in a radial direction to center the disc-shaped resin sub-

strates (D1 and D2).

4. The method according to Claim 2 or 3, wherein the adhesive (R) is drawn in the direction of central holes (DH) of the disc-shaped resin substrates (D1 and D2) through the boss (1) in the step of spreading the boss (1) inserted into the central holes (DH) of the disc-shaped resin substrates (D1 and D2) outward to center the disc-shaped resin substrates (D1 and D2).

5. The method according to Claim 2, wherein the method in Claim 2 is performed in a different position after the adhesive (R) is developed.

6. A method of correcting nonalignment of a storage disc (D) comprising steps of irradiating an entire storage disc (D) with UV rays to cure an adhesive (R) between disc-shaped resin substrates (D1 and D2) constituting the storage disc (D) after the method of Claim 2 is performed.

7. A method of correcting nonalignment of a storage disc (D) comprising steps of:

   placing disc-shaped resin substrates (D1 and D2), which have central holes (DH) and constitutes the storage disc (D) and intervene an adhesive (R) therebetween, on a centering holding table (X1) provided with a boss;
   spreading the boss (1) inserted into the central holes (DH) of the disc-shaped resin substrates (D1 and D2) outward for centering the disc-shaped resin substrates (D1 and D2);
   drawing the adhesive (R) in the directions of the central holes (DH) of the disc-shaped resin substrates (D1 and D2) through the boss; and
   partially irradiating an adhesive (R) interposed between the disc-shaped resin substrates (D1 and D2) with UV rays for curing the disc-shaped resin substrates (D1 and D2) in the vicinity of the centers thereof to temporarily fix the disc-shaped resin substrates (D1 and D2).

FIG.1 (A)

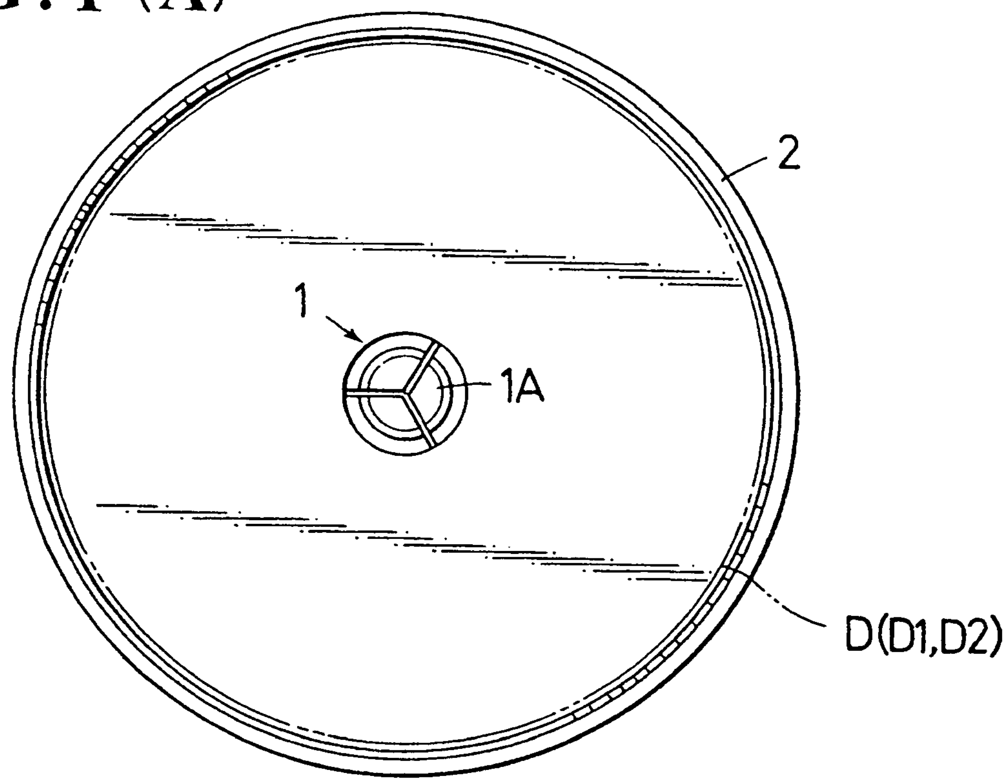

FIG.1 (B)

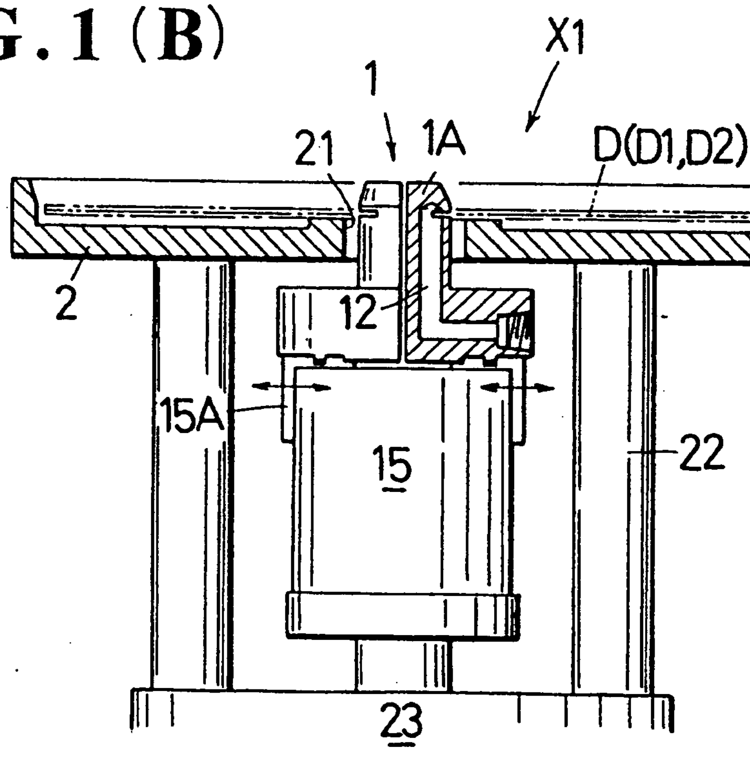

FIG. 2 (A)

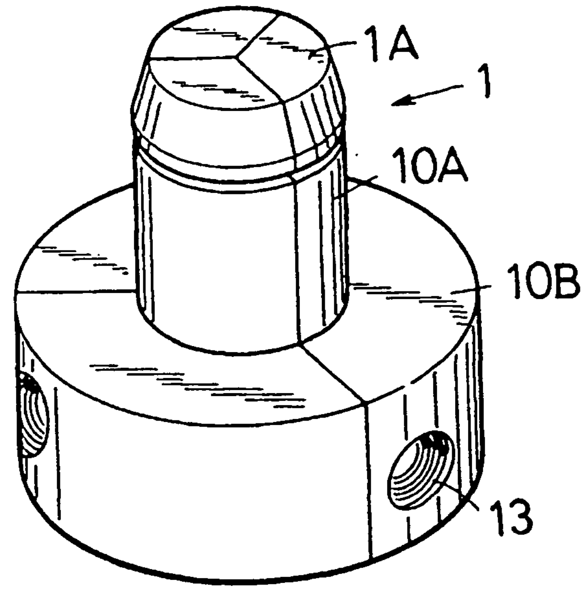

FIG. 2 (B)

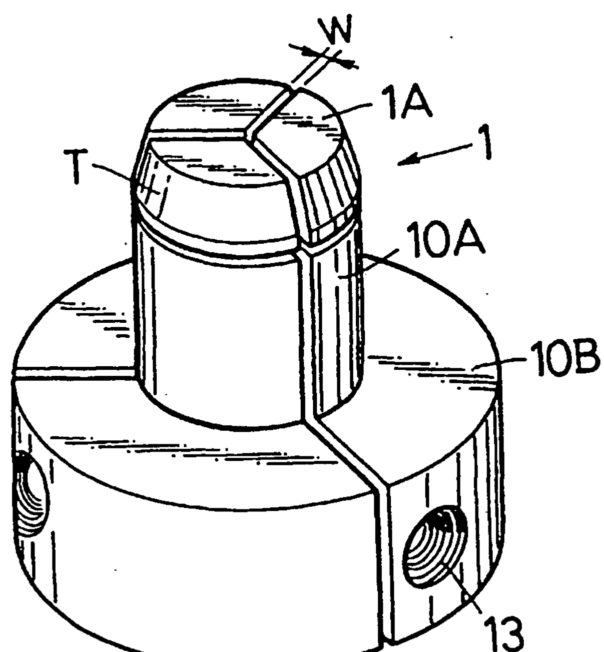

FIG.3

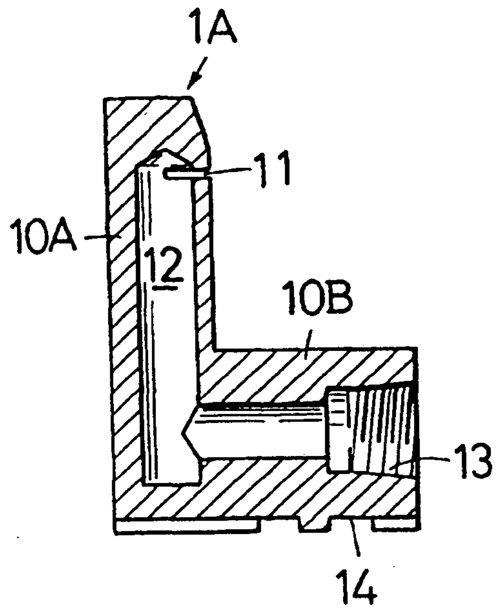

FIG.4 (A)

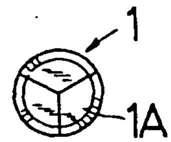

FIG.4 (B)

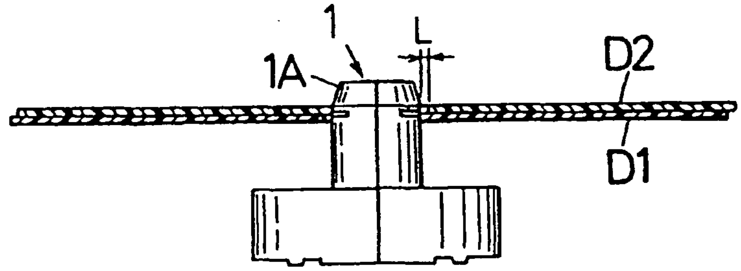

FIG.5 (A)

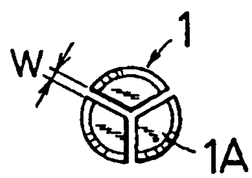

FIG.5 (B)

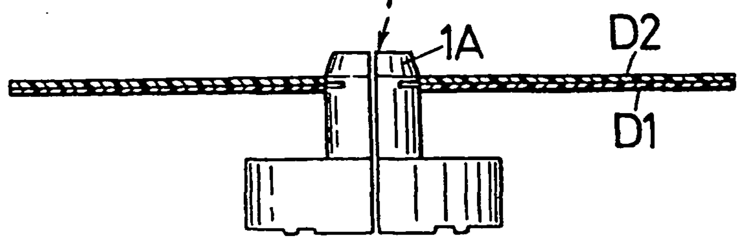

FIG.6(A)

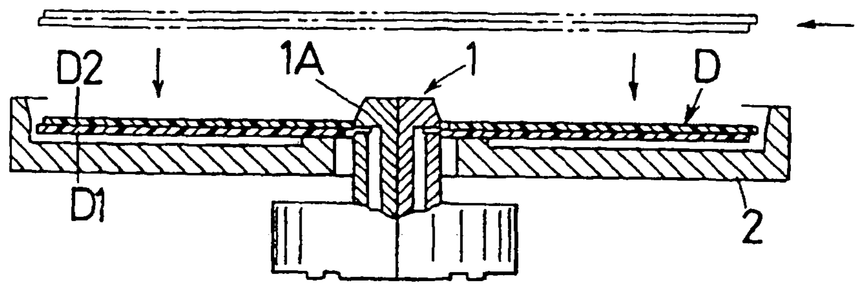

FIG.6(B)

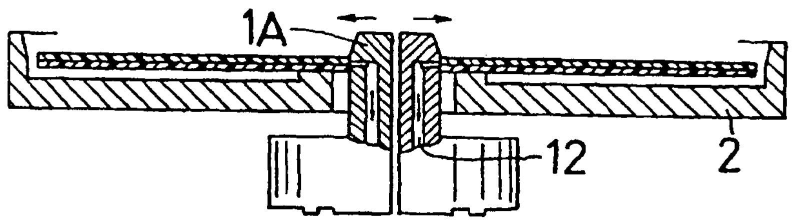

FIG.6(C)

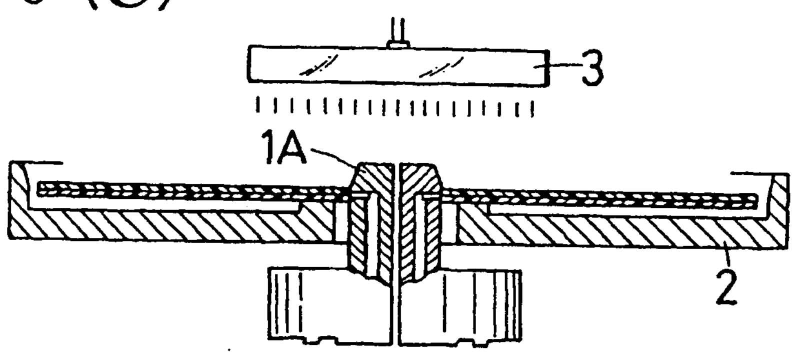

FIG.6(D)

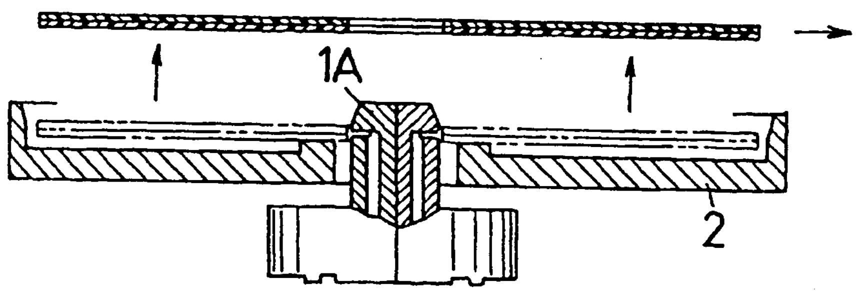

FIG.7 (A)

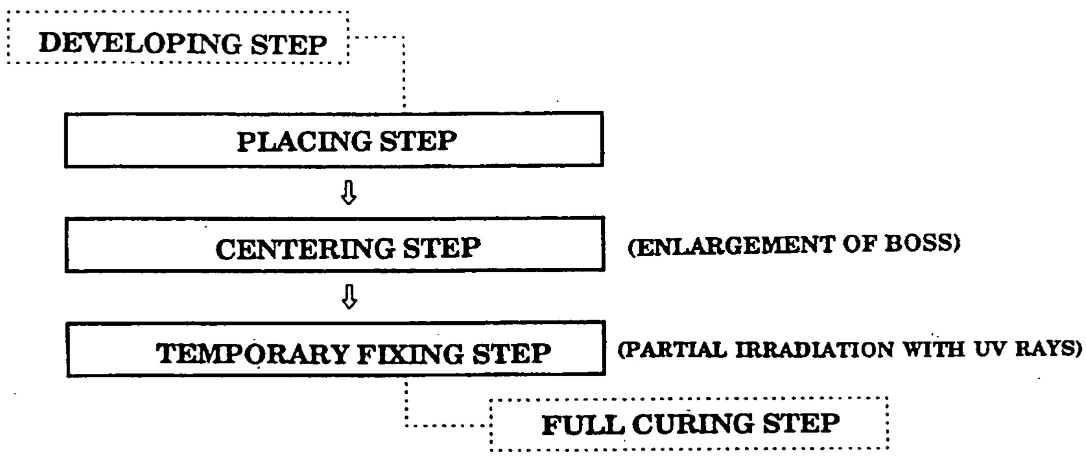
DEVELOPING STEP
PLACING STEP
CENTERING STEP
(ENLARGEMENT OF BOSS)
TEMPORARY FIXING STEP
(PARTIAL IRRADIATION WITH UV RAYS)
FULL CURING STEP

FIG.7 (B)

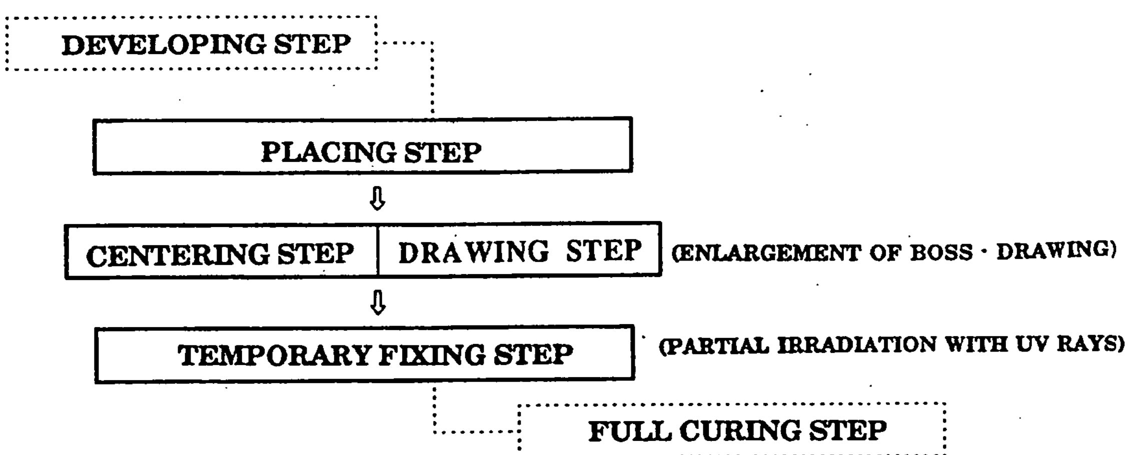
DEVELOPING STEP
PLACING STEP
CENTERING STEP
DRAWING STEP
(ENLARGEMENT OF BOSS · DRAWING)
TEMPORARY FIXING STEP
(PARTIAL IRRADIATION WITH UV RAYS)
FULL CURING STEP

FIG.8 (A)

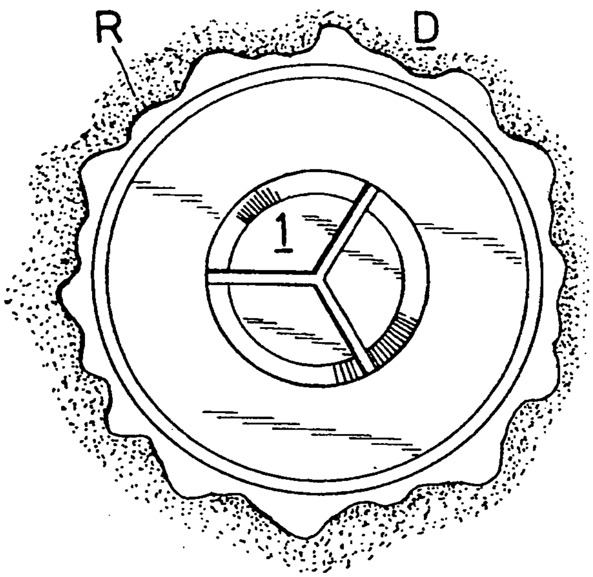

FIG.8 (B)

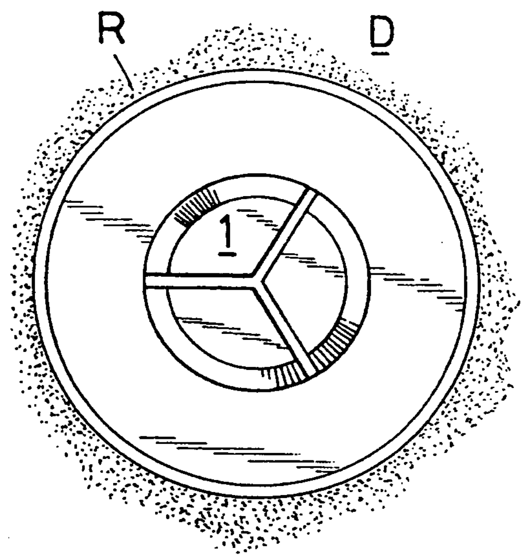

FIG.9 (A)

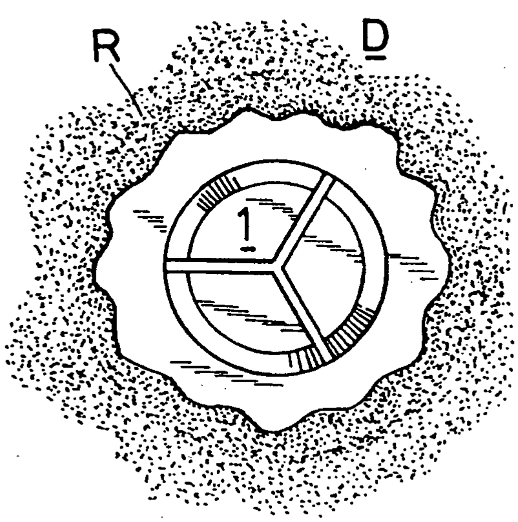

FIG.9 (B)

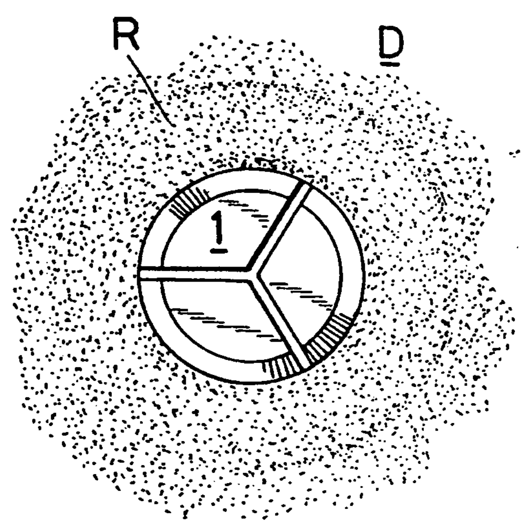

FIG.10

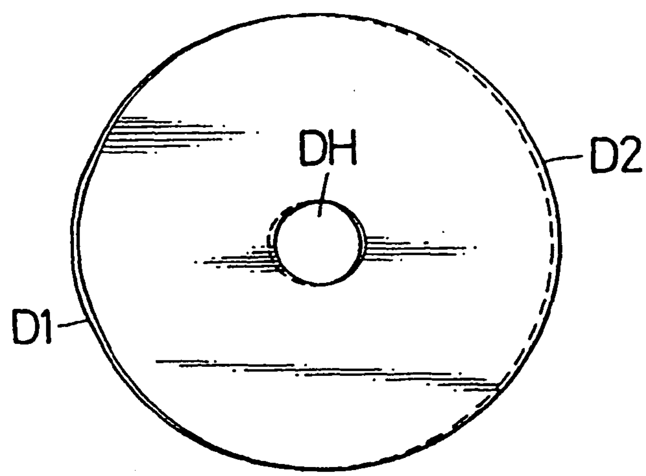

FIG.10 (B)

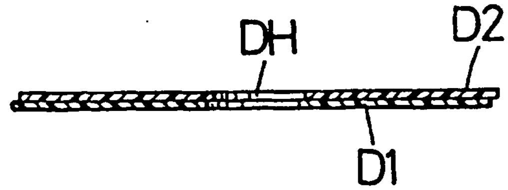

FIG. 11 (A)

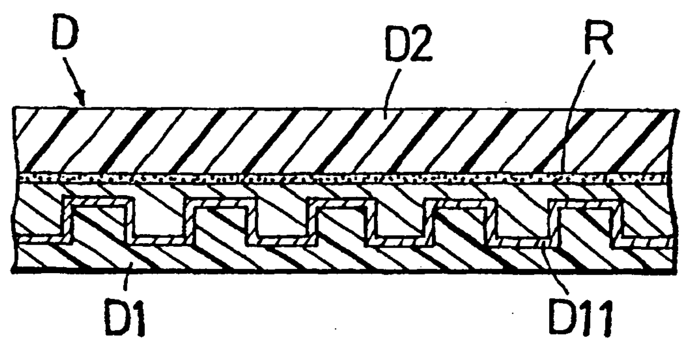

FIG. 11 (B)

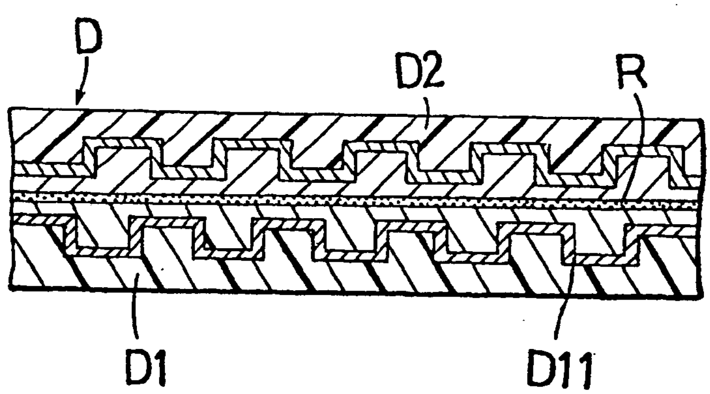

FIG. 12

PRIOR ART